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PENSOFT

First record of *Utricularia breviscapa* C.Wright ex Griseb. (Lentibulariaceae) in Rio de Janeiro state, Brazil

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Abstract

Utricularia breviscapa C.Wright ex Griseb. belongs to the Lentibulariaceae, a family of carnivorous plants with many aquatic species. We report a new record of *U. breviscapa* in a perennial wetland along the São João River, in a Lowland Forest within the Atlantic Forest biome. This is the first record of this species from the state of Rio de Janeiro, southeastern Brazil. *Utricularia breviscapa* differs from the its aquatic congeners in South America by the presence of a whorl of 3–7 basally connate cylindrical floats at the base of the floral scape, and by the primary and secondary leaf-segments arranged into groups of threes.

Keywords

Atlantic Forest, hydrophyte, macrophyte, wetland

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Introduction

Utricularia L. (Lentibulariaceae, Lamiales) is a genus of aquatic, terrestrial, epiphytic, rheophytic, or lithophytic carnivorous herbs which display a sensitive utricle (prey trap) composed of modified leaves specialized in capturing and digesting small insects, aquatic microorganisms, and algae (Sirová et al. 2009; Guedes et al. 2020). Species of this genus form stolons and do not exhibit roots, but may bear rhizoids, which are anchorage organs that do not uptake nutrients from the substrate. Leaves are on the scape or rhizoid, aerial or submerged, filiform to circular, entire or divided into many filiform segments, and arranged in rosettes. The utricules are most commonly developed in stolons, but also in leaves and rarely in rhizoids. Inflorescences are emergent in aquatic and amphibious species, and the flowers are bilabiate with a spur (Taylor 1989). The genus comprises approximately 240 species in tropical and subtropical regions (Guedes et al. 2021). In Brazil, 71 species are distributed in all biomes, but only 20 are currently recorded from the state of Rio de Janeiro; two of them are endemic (Guedes et

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al. 2020). The state of Rio de Janeiro presents a great diversity and many endemic species, despite the marked deforestation and forest fragmentation (Myers et al. 2000; Ribeiro et al. 2009). The biodiversity in Rio de Janeiro is still poorly documented (e.g., Colli-Silva et al. 2020), highlighting shortfalls in biodiversity knowledge that hamper the accurate recognition of biodiversity patterns and predictions, as well as the effectiveness of conservation strategies (Hortal et al. 2015). Here, we report the first record of *U. breviscapa* from the state of Rio de Janeiro, where it was found in a small wetland in the Atlantic Forest biome.

Methods

Expeditions were carried out in the wetland Ribeirão das Crioulas (near the Biological Reserve Poço das Antas, Rio de Janeiro state, Brazil. Ribeirão das Crioulas is a perennial wetland area connected to the São João River, within a Lowland Forest of the Atlantic Forest biome. Samplings took place monthly between May 2019 and February 2020. However, the species was recorded only in May 2019, with a single flower found. The regional climate is hot and wet in summer and cold and dry in winter (Aw climate of the Köppen climate classification; Bernardes 1952). Specimens were stored in 70° GL alcohol, photographed, and deposited in the herbarium of Museu Nacional, R (Thiers 2021). We consulted GBIF (2021) and SpeciesLink (2021) platforms for records of *U. breviscapa* for building a geographical distribution map in QGIS. We only included records identified by taxonomic specialists in the group or records with digitized images enabling confirmation of the identifications. The description was based on collected material and the literature. Additionally, we recorded abiotic data for characterizing the habitat of the new record. Rainfall data were collected from the nearest weather station, transparency with Secchi disk, depth was measured with measuring tape, and water temperature and pH with Akso portable sensors. The area is dominated by *Salvinia auriculata* Aubl. (Salviniaceae), a free-floating species.

Results

***Utricularia breviscapa* Wright ex Griseb.**
Figure 1

New record. BRAZIL, Rio de Janeiro • Silva Jardim, Ribeirão das Crioulas, near Juturnaíba dam; 22°35′ 20.8″S, 042°16′31.8″W. 08.VI.2019; *Canalli, Y.M. 96*, [leg.]; R 215858.

Description. A hydrophyte. Rhizoids absent. Leaves divided in filiform segments, the primary and secondary leaf-segments arranged in groups of three. Traps ovoid, mouth lateral with 2 dorsal setiform branched appendages. Inflorescence emergent, peduncule spongy bearing at the base a whorl of 3–7 cylindrical spongy floats. Scales absent. Bracts basifixed; bracteoles absent.

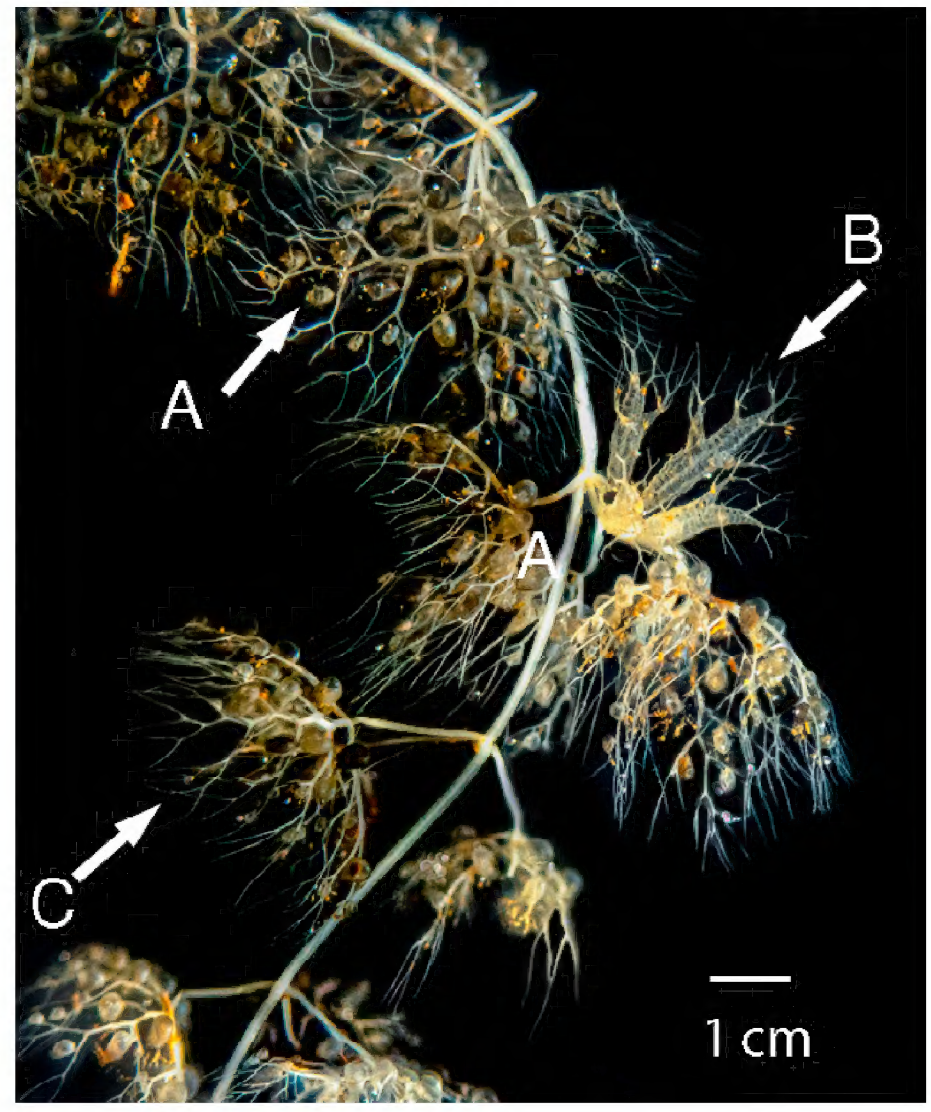

Figure 1. *Utricularia breviscapa*: A = trap, B = float, and C = leaves. (*Canalli, Y.M. 96*).

Flowers 1–4 per inflorescence, calyx lobes subequal, circular to obovate; corolla yellow, lower lip deeply 3-lobed; spur about as long as the lower lip. Capsule circumscissile; seeds lenticular (Taylor 1989).

The species was recorded in a perennial wetland bordering the São João River and Juturnaíba dam, located in one of the rare fragments of the Lowland Forest in the Atlantic Forest biome.

Identification. In the Rio de Janeiro population, it was observed a spongy peduncle with a whorl of 4 spongy floats. There are 11 species of *Utricularia* with a leaf-life whorl on the base of the peduncle. Only three of them occur in Brazil: *U. platensis* Speg., *U. benjaminiana* Oliver, and *U. breviscapa*; the latter exhibiting a broader distribution than the former ones. *Utricularia breviscapa* differs from the other ones by having primary and secondary leaf segments arranged in threes. This species is most abundant in the Pantanal (Pott and Pott 2000) and the Amazon Forest, with rare occurrences in the Atlantic Forest (Guedes and Alves 2020).

Geographic distribution. Cuba, Guyana, Suriname, French Guiana, Venezuela, Colombia, Ecuador, Bolivia, Brazil, Paraguay, and Argentina. Among Brazilian states, *U. breviscapa* has been recorded in Roraima, Amazonas, Pará, Piauí, Tocantins, Mato Grosso, Goiás, Mato Grosso do Sul, Bahia, Minas Gerais, and São Paulo (Fig. 2; Taylor 1989; Jairam-Doerga 2017; Guedes et al. 2020).

Habitat. The new record comes from a eutrophic wetland bordering a large river within a Lowland Forest of the Atlantic Forest biome. During sampling expeditions,

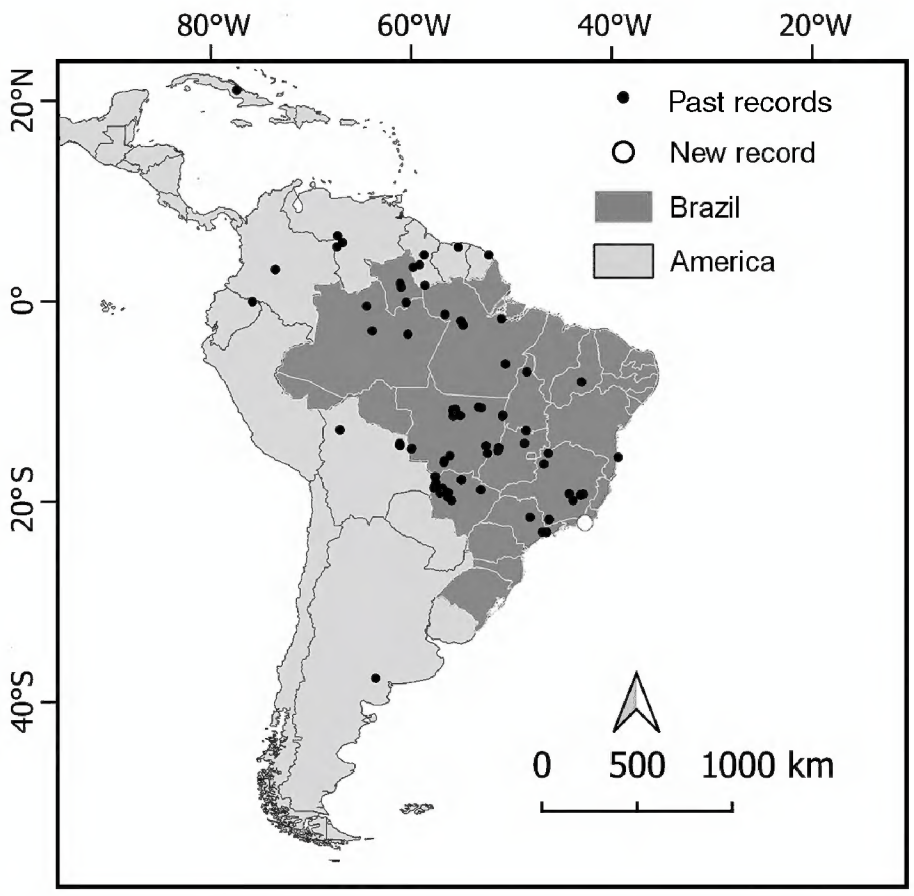

Figure 2. Distribution of *Utricularia breviscapa*. Occurrence data used in this map are presented in Appendix Table A1.

we recorded the following environmental conditions (minimum–maximum): 1–2 m depth, pH 5.1–8.1, photoperiods 10.8–13.5, rainfall 50–330 mm/month, transparency 0.2–1.5 m, and water temperature 18.7–31 °C.

Discussion

We recorded *Utricularia breviscapa* in the rainy season and only one flower in May 2019. It has low coverage and is locally rare. *Utricularia breviscapa* is usually found in wetland and shallow lakes in nutritionally poor, acidic waters (Juniper et al. 1989). Nevertheless, Ribeirão das Crioulas eutrophic and dominated by *Salvinia auriculata*, highlighting that *U. breviscapa* can occupy a wider environmental conditions than previously thought, including eutrophic ecosystems and basic waters. In the study area, we found another aquatic species of *Utricularia*, *U. foliosa* L., which differs from *U. breviscapa* by not having floats.

The occurrence of *U. breviscapa* in Rio de Janeiro state was thought to be unlikely, as the family was recently monographed in the state, and *U. breviscapa* was not reported (Baleeiro et al. 2017). The nearest record is approximately 300 km from Ribeirão das Crioulas, in the Rio Doce basin in Minas Gerais state. The IUCN Red List classified the species as Least Concern (Clarke 2018), even though Brazilian wetlands are highly threatened by human activities, such as urbanization and agriculture (Junk et al. 2014). The site of the new record is near one of the largest dams in Rio de Janeiro (Rocha and Neto 2018). Damming may favor species associated with lacustrine environments and disrupt macrophyte dispersal, compromising the distribution and long-term persistence of other species (Ceschin et al. 2015; Jones et al. 2020).

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Authors' Contributions

Data curation: YMC. Conceptualization: BES, ADRM, CMS. Formal analysis: YMC. Supervision: BES, ADRM, CMS. Visualization: YMC. Writing – original draft: YMC. Writing – review and editing: BES, ADRM, CMS.

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Appendix

Table A1. Geographical distribution of *Utricularia breviscapa*.

Herbarium	Code	Collector	Collector number	Country	Latitude	Longitude
HERB	44491	Schinini, A.	NA	Argentina	−38.3609	−063.6068
US	3703035	Ritter, N.; Crow, G.; Garvizu, M.; Ritter, M.; Crow, J.	3500	Bolivia	−14.7000	−061.1300
MOBOT	1092947	Ritter, N.; Crow, E.G.; Garvizu, M; Ritter, M.; Crow, J.	Ritter 3500	Bolivia	−14.6997	−061.1405
MOBOT	1093004	Ritter, N.; Crow, E.G.; Garvizu, M; Ritter, M.; Crow, J.	Ritter 3543	Bolivia	−14.6091	−061.1919
MOBOT	1093008	Ritter, N.; Crow, E.G.; Garvizu, M; Ritter, M.; Crow, J.	Ritter 3547	Bolivia	−14.4697	−061.1508
MOBOT	1825745	Ritter, N.; Crow, E.G.; Garvizu, M; Solíz, P.	Ritter 4395	Bolivia	−13.5869	−061.0191
MOBOT	1860909	Beck, S.G.	Beck 10064	Bolivia	−13.0833	−067.2500
MOBOT	1864994	Haase, R.	Haase 373	Bolivia	−13.0833	−067.2500
NYBG	04207903	Ritter, N.	3547	Bolivia	−14.4697	−061.1508
MIRR	5749	Ferreira, C.A.C.; Lima, J.; Maduro, C.B.; Erazo, ND de C; Bacelar-Lima, C.G.	12399	Brasil	01.4022	−060.9970
NHM-LONDON-BOT	BM000953468	Spruce, R.	1053	Brasil	−2.4412	−054.7150
HUMC	2074	Miranda, V.F.O.	1476	Brazil	−23.5228	−046.1883
G	G00368546	Spruce, R.	NA	Brazil	−10.7730	−053.0897
FMNH-SEEDPLANTS	V0470033F	Ginzberger, A. & Zerny, H.	572	Brazil	−10.8339	−052.8731
FMNH-SEEDPLANTS	V0470034F	Huber, J.E	734	Brazil	−10.8339	−052.8731
CEPEC	43929	Santos, T.S.	4392	Brazil	−15.8631	−038.8828
CEN	17550	Walter, B.M.T	1934	Brazil	−14.4738	−048.4597
CEN	71411	Pereira-Silva, G.	11652	Brazil	−13.1658	−048.2883
US	2688931	Eiten, G.; Eiten, L.T.	10163	Brazil	−7.2000	−048.2300
PERD	761	Pivari, M.O; Costa, F.M; Oliveira, V.B	1198	Brazil	−19.6647	−042.4766
HSTM	5577	Maielo, L.	NA	Brazil	−06.3969	−050.3725
ESA	38901	Souza, V.C.; Souza, J.P.; Duarte, A.R.; Mazine, F.F.	14224.0	Brazil	−11.6171	−050.6693
HUNI	6226	Bove, C.P.; Koehler, S.; Jones, E.J.M.	202	Brazil	−14.9202	−051.0830
HUNI	6228	Bove, C.P.; Koehler, S.; Lisbôa, R.	298	Brazil	−15.2411	−051.1605
HUNI	6227	Bove, C.P.; Koehler, S.; Morrey-Jones, J.	222	Brazil	−14.9202	−051.0830
CPAP	10063	Cervi, A.C.	3327	Brazil	−19.0091	−057.6533
CPAP	11460	Pott, A.	6440	Brazil	−19.0666	−056.7833
CPAP	14074	Pott, V.J.	2780	Brazil	−19.2500	−057.0500
CPAP	16982	Pott, V.J.	3349	Brazil	−19.9580	−056.2441
CPAP	25154	Pott, V.J.	4930	Brazil	−17.8416	−057.5598
HAMAB	NA	Tostes, L.C.L.	247	Brazil	00.1666	−051.2666
HAMAB	NA	Costa Neto, S.V.	936	Brazil	−1.7666	−050.8000
CNMT	8758	Córdova, M.O.; Keffer, J.F.	616	Brazil	−11.6719	−055.7133
CNMT	8832	Córdova, M.O.; Keffer, J.F.; Souza, P.	781	Brazil	−11.5822	−055.6418
CNMT	8820	Córdova, M.O.; Keffer, J.F.; Souza, P.	768	Brazil	−11.6719	−055.7133
CNMT	8883	Córdova, M.O.; Jonk, L.; Oliveira, I.S.; Souza, R.; Baptista, A.P.	974	Brazil	−11.6013	−055.4275
TANG	1830	Abdo, M.S.A.	116	Brazil	−15.0488	−059.9758
TANG	1799	Abdo, M.S.A.	97	Brazil	−14.9992	−059.9602
TANG	4665	Engels, M.E.; Freitas, J.A.O.; Silva, L.S.	5144	Brazil	−11.2223	−055.7260
TANG	4617	Engels, M.E.; Lessa, J.E.L.; Silva, L.S.	5450	Brazil	−11.2650	−055.5064
NX-FANEROGAMAS	1539		BS282	Brazil	−14.7172	−052.3630
FUEL	29764	Kinupp, V.F.	1112	Brazil	−19.0091	−057.6533

Herbarium	Code	Collector	Collector number	Country	Latitude	Longitude
MBM	413413	Engels, M.E.; Freitas, J.A.O.; Silva, L.S.; Freitas, J.A.O.; Silva, L.S.	5144	Brazil	−11.0255	−055.7261
MBM	413414	Engels, M.E.; Lessa, J.E.L.; Silva, L.S.; Lessa, J.E.L.; Silva, L.S.	5450	Brazil	−11.0183	−055.5063
MBM	413474	Engels, M.E.; Sehn, H.; Antoniazzi, S.A.; Sehn, H.; Antoniazzi, S.A.	5101	Brazil	−11.6402	−055.0055
CGMS	19306	Oliveira, A.P.; Kufner, D.C.L.; Bertazzoni, E.C.; Boas, J.C.V.	44	Brazil	−19.5261	−057.0408
CGMS	27240	Moreira, S.N.; Assunção, V.A.; Rodrigues, L.S.; Bueno, B.	241	Brazil	−18.4994	−057.4608
CGMS	33777	Soares, V.C.; Kochanovski, F.J.; Garcia, M.M.; Alcântara, N.V.	46	Brazil	−19.4822	−057.0166
CGMS	48019	Pott, V.J.; Pott, A.	10569	Brazil	−19.2038	−052.9213
CGMS	57849	Pott, V.J.; Pott, A.	7895	Brazil	−19.5030	−056.2266
CGMS	57879	Pott, V.J.; Lima, L.C.P.	4930	Brazil	−17.8416	−057.5597
CGMS	57923	Coutinho, B.A.; Aoki, C., Simão, C.H.	161	Brazil	−20.3013	−055.8644
CGMS	6099	Scremin-Dias, E	227	Brazil	−19.0091	−057.6533
CGMS	68949	Pott, V.J.; Pott, A.	11679	Brazil	−19.4219	−057.0472
CGMS	70695	Pott, V.J.; Pott, A.	9299	Brazil	−15.5069	−052.2030
CGMS	76006	Moreira, S.N.; Pott, V.J.; Pott, A.; Fabri, J.B.	1554	Brazil	−18.1850	−054.8900
INPA	213691	Ferreira, C.A.C.	12399	Brazil	01.4022	−060.9972
INPA	219348	Gutierres, M.G.	55	Brazil	−03.0000	−064.0000
INPA	237682	Costa, S.M.	858	Brazil	01.4686	−061.0311
INPA	67695	Carreira, L.M.M.	187	Brazil	−03.3333	−060.3333
IAC	2365	Viégas, A.P.	s/nº	Brazil	−19.6272	−043.8897
NYBG	01173357	Ferreira, C.A.C.	1576	Brazil	−01.3418	−056.5784
NYBG	01173358	Alencar, M.L.	224	Brazil	−00.5000	−064.5420
ASE	40041	Santos, L.A.S.; Chichura, F.M.; Souza, C.G.V.; Silva, R.A.F.	4502	Brazil	−00.1048	−060.5024
SPF	136788	Rivadavia, F.	951	Brazil	−15.5012	−046.0111
SPF	136789	Rivadavia, F.	972	Brazil	−16.5711	−046.4825
SPF	180151	Rivadavia, F.	2473	Brazil	−16.4032	−056.6680
SPF	184590	Cardoso, M.R.F.	117	Brazil	−15.7246	−056.0477
SPF	184591	Cardoso, M.R.F.	110	Brazil	−11.6943	−050.6757
SPF	75827	Rivadavia, F.	148	Brazil	−19.0091	−057.6533
SPF	76796	Pott, V.J.	875	Brazil	−19.2333	−057.0500
HCF	24626	Engels, M.E.	5144	Brazil	−11.0255	−055.7261
HCF	7029	Oliveira, A.P.	44	Brazil	−19.5261	−057.0407
UEC	136497	Prado, A.L.	2650	Brazil	−16.2567	−056.6227
UEC	154690	Costa, S.M.; Cangani, K.G.	858	Brazil	01.8161	−061.1281
BHCB	184798	Moreira, S.N.; Pott, A.; Pott, V.J.; Fabri, J.B.	1554	Brazil	−18.1847	−054.8897
BHCB	22703	Lombardi, J.A.	367	Brazil	−19.7122	−042.7322
R	3609	Glaziou, A.F.M.	25316 a	Brazil	−20.2875	−043.5080
R	221874	Oliveira, S.A.; Garcia, J.; Augustom, J.	NA	Brazil	−15.0080	−059.9505
R	221871	Emmerich, M.; Santos, E.A.A.; Trinta, E.F.	NA	Brazil	−15.0080	−059.9505
R	97231	Luetzelburg, P.	20575	Brazil	−28.9710	−051.0680
R	221872	Hoehne, F.C.	NA	Brazil	−22.2299	−045.9364
R	131741	Frederico, C.; Menezes, S.	NA	Brazil	−22.0100	−047.8899
R	232467	Donza, A.; Suemitsu, C.	NA	Brazil	−02.4430	−054.7083
R	221882	Marimon, B.S.	282	Brazil	−14.7172	−052.3630
R	211284	Bove, C.P.; Philbrick, C.T.	NA	Brazil	−8.3229	−043.1747
UFMT	28368	Souza, V.C.; Souza, J.P.; Duarte, A.R.; Mazine, F.F.	14224	Brazil	−11.6171	−050.6693
UFMT	41119	Rebellato, L.	169	Brazil	−16.2567	−056.6227
SP	127896	Eiten, G.; Eiten, L.T.	10163	Brazil	−07.2000	−048.2333
SP	19203	Hoehne, F.C.	NA	Brazil	−22.2299	−045.9364
SP	7755	Gehrt, G.	NA	Brazil	−23.5400	−046.6300
MOBOT	1876879	Davidse, G.; Llanos, F.	Davidse 5424	Colombia	03.2312	−073.8674
NHMUK	BM000884455	Wright, C.	2893	Cuba	21.6211	−079.0363
MOBOT	498022	Brandbyge, J.S.	Brandbyge 36147	Ecuador	−00.0166	−076.1833
FMNH-SEEDPLANTS	V0470035F	Cook, C.D.K.	77	Guyana	04.7364	−058.7017
US	3268830	Jansen-Jacobs, M.J.; Lughadha, E.N.; Welle, B.; Gopaul, D.	1460	Guyana	01.6500	−058.6300
US	2547994	Goodland, R.	879	Guyana	03.4800	−059.8000
US	3426252	Horn, C.N.; Wiersema, J.H.	11018	Guyana	03.7500	−059.1600
MOBOT	3061854	Jansen-Jacobs, M.J.; Lughadha, E.M.N; Welle, B.J.H.; Gopaul, D.	Jansen-Jacobs 1460	Guyana	01.6500	−058.6333
MOBOT	1848820	Davidse, G.; González, A.C.	Davidse 14693	Venezuela	06.0007	−067.0003
MOBOT	1871595	Davidse, G.; González, A.C.	Davidse 15714	Venezuela	06.6666	−067.5000
MOBOT	3061838	Steyermark, J.A.; Holst, B.K.; Manara, B.J	Steyermark 131499	Venezuela	05.5833	−067.5666
NYBG	04207904	Steyermark, J.A.	131499	Venezuela	05.5800	−067.5700
RECOLNAT_MNHN_P	P04428308	Davidse, G.; González, A.C.	NA	Venezuela	06.6666	−067.5000